

REMARKS

Claims 1-9 and 12-21 are all the claims presently pending in the application. Claims 1-9 have been merely editorially amended and have not been substantively amended to more particularly define the invention. Claims 12-21 have been added to claim additional features of the invention and to provide more varied protection of the claimed invention.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Applicants gratefully acknowledge the Examiner's indication that claims 8 and 9 are allowed, and that claims 2-7 would be allowable if rewritten in independent form. However, Applicants respectfully submit that all of the pending claims are allowable.

Claim 1 stands rejected under 35 U.S.C. §103(a) as being obvious over Tei et al. (Japanese Patent No. 11-031859) (hereinafter "Tei") in view of MacDonald et al. (United States Patent No. 6,011,623) (hereinafter "MacDonald").

This rejection is respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

The claimed invention (e.g., as defined by exemplary claim 1) is directed to an output monitor/control device. The device includes a Mach-Zehnder circuit that receives a light beam, branches the received light beam into two light beams having a phase difference of 180°, and transmits each of the light beams, exhibiting a periodic optical transmittance-optical frequency characteristic with a period of a frequency interval corresponding to a predetermined free spectral range. A first photoelectric conversion means and a second

photoelectric conversion means each for receiving a respective one of two light beams that have emerged from the Mach-Zehnder circuit, and a calculation means for calculating a predefined discrimination formula to evaluate a wavelength change in each of the light beams based on conversion outputs of the first photoelectric conversion means and the second photoelectric conversion means. The conversion outputs change responsively to a wavelength change in accordance with the optical transmittance-optical frequency characteristic.

In conventional output monitor/control devices, the wavelength of a laser light is controlled by adjusting the ratio of the outputs of two photodiodes to a prescribed value. As a result, there is the problem that the control of laser light wavelength is restricted only within a narrow wavelength range in which the characteristics curves of outputs complementarily change according to the slopes in opposite directions.

The claimed invention of exemplary claim 1, on the other hand, provides an output monitor/control device including a Mach-Zehnder circuit that receives a light beam, branches the received light beam into two light beams having a phase difference of 180°, and transmits each of the light beams, exhibiting a periodic optical transmittance-optical frequency characteristic with a period of a frequency interval corresponding to a predetermined free spectral range (e.g., see Application at page 9, lines 11-16). The output monitor/control of the claimed invention can be applied itself, with high accuracy, to a wide range of wavelengths, allowing for a simplified device structure (see Application at page 8, lines 24-27).

II. THE PRIOR ART REFERENCES

The Examiner alleges that Tei would have been combined with MacDonald to teach the claimed invention of claim 1. Applicant respectfully submits, however, these references

would not have been combined as alleged by the Examiner and that, even if combined, the alleged combination would not teach or suggest each and every feature of the claimed invention.

That is, these references are directed to different problems and solutions. Specifically, Tei is directed to controlling the emission wavelength of a laser beam source (see Tei at Abstract), whereas MacDonald is directed to detecting and monitoring faults in optical fibers in the presence of traffic (see MacDonald at column 2, lines 44-46). Indeed, while MacDonald teaches the use of a Mach-Zender circuit, nowhere does MacDonald teach or suggest using a Mach-Zehnder circuit in an output monitor/control device. Therefore, these references are completely unrelated, and a person of ordinary skill in the art, attempting to improve Tei, would have no reasonable motivation to consult the disparate reference MacDonald, absent impermissible hindsight.

Moreover, the Examiner's motivation to modify Tei ("to provide circuit which separate the light beam without additional optical component such as optical filter and hence provide compact packaging and reduce costs") is not a problem in MacDonald that would require a solution. Thus, as pointed out in MPEP 2143.01, the Examiner's motivation is "improper". That is, "the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination" (emphasis in MPEP itself).

Furthermore, Applicants point out that the MPEP clearly states that "[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious" (see MPEP 2143.01).

Tei, as discussed in the Background of the Invention section of the Application, teaches that laser light is emitted from a laser diode and passes through a cutoff filter, which

is then incident on a beam splitter. A light beam that is transmitted by the beam splitter is applied to a measurement device and used as light having a stabilized wavelength. Light reflected by the beam splitter is directed to a bandpass filter. A part of the reflected light beam transmitted by the filter impinges on a first photo-diode. The light reflected from the filter pass through the beam splitter and impinges on the second photodiode. The outputs of the first and second diodes are applied to the calculation means (see Application at page 3, line 22 through page 4, line 19).

In stark contrast, MacDonald provides a means for detecting a break in an optical fiber. A tap (202) is coupled to a fiber for tapping a small portion of light. A 50:50 splitter (204) receives the tapped light from the tap (202) and divides the received light evenly on two paths. An unbalanced Mach Zehnder interferometer (206) is coupled to the output of the splitter for providing two separate outputs (see MacDonald at column 4, lines 52-65).

Thus, combining the Mach Zehnder interferometer of the MacDonald with the device of Tei would clearly change the principle of operation of the device disclosed in Tei. Therefore, Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness.

Moreover, neither Tei nor MacDonald, nor any combination thereof, teaches or suggests “*a Mach-Zehnder circuit that receives a light beam, branches the received light beam into two light beams having a phase difference of 180°, and transmits each of the light beams, exhibiting a periodic optical transmittance-optical frequency characteristic with a period of a frequency interval corresponding to a predetermined free spectral range*” as recited in claim 1.

The Examiner concedes that Tei does not teach or suggest a Mach-Zehnder circuit that receives a light beam, branches the received light beam into two light beams having a phase difference of 180°, and transmits each of the light beams, exhibiting a periodic optical

transmittance-optical frequency characteristic with a period of a frequency interval corresponding to a predetermined free spectral range (see Office Action dated July 25, 2005 at page 3).

The Examiner attempts to rely on MacDonald as teaching an optical communication system using a Mach-Zehnder circuit. The Examiner relies on features from Figure 2 and column 5, lines 20-44 of MacDonald to support his allegations. The Examiner, however, is clearly incorrect.

That is, nowhere in this figure nor this passage (nor anywhere else for that matter) does MacDonald teach or suggest a Mach-Zehnder circuit that receives a light beam, branches the received light beam into two light beams having a phase difference of 180°, and transmits each of the light beams, exhibiting a periodic optical transmittance-optical frequency characteristic with a period of a frequency interval corresponding to a predetermined free spectral range. Indeed, MacDonald teaches using a splitter (202) to branch the received light beam into two light beams having a phase difference of 180°. Nowhere does MacDonald teach or suggest that the Mach-Zehnder circuit (206) branches the received light beam into two light beams having a phase difference of 180°, as provided by the claimed invention.

Thus, MacDonald fails to make-up the deficiencies of Tei.

Therefore, Applicant respectfully submits that these references would not have been combined as alleged by the Examiner and that, even if combined, the alleged combination would not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to reconsider and withdraw this rejection.

III. NEW CLAIMS

New claims 12-21 have been added to provide more varied protection for the claimed invention and to claim additional features of the invention. These claims are independently patentable because of the novel features recited therein.

Applicant respectfully submits that new claims 12-21 are patentable over any combination of the applied references at least for analogous reasons to those set forth above with respect to claim 1.

IV. FORMAL MATTERS AND CONCLUSION

In accordance with the Examiner's objections, the claims have been amended. Specifically, the term "appropriately" has been deleted from claim 8.


In view of the foregoing, Applicant submits that claims 1-9 and 12-21, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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Scott M. Tulino, Esq.
Registration No. 48,317

Sean M. McGinn, Esq.
Registration No. 34,386

**MCGINN INTELLECTUAL PROPERTY
LAW GROUP, PLLC**
8321 Old Courthouse Road, Suite 200
Vienna, VA 22182-3817
(703) 761-4100
Customer No. 21254